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THE LANDLINE SYSTEM OF THE USSR

/The following report attempts to give a general picture of the development of the landline system in the USSR on the basis of Soviet documents. The basic source used for the period up to 1940 was Ekonomika Svyazi (The Economics of Communications), by S. L. Krapivner, which was published in 1940. Books and periodicals published since 1940 have been used to supplement Ekonomika Svyazi material./

I. HISTORY OF THE LANDLINE SYSTEM

A. Telephone and Telegraph Lines

On 1 January 1913 the number of telephone lines used by the government, private enterprises, and zemstvos was 87.(1) A considerable portion of telegraph wire networks was turned over to the Red Army; its length was 46,000 kilometers in 1918, 45,000 kilometers in 1919, and 70,000 kilometers in 1920. Almost all the lines were trunk lines, making up about 16 percent of the network of the People's Commissariat of Post and Telegraph.(2) The telegraph network used for telephone calls amounted to more than 83,000 kilometers of wire in October 1925. The struggle to increase the number of telephone channels prompted the use of telegraph wires for telephone communications.(3) From 1921 to 1925 the length of nonferrous metal wire circuits had almost doubled.(4) From 1926 to 1929 the length of telephone and telegraph wires grew 340,000 kilometers, or by 55 percent of the 1925 level. On 1 January 1930, the length of telephone and telegraph wires was almost double the 1913 level.(5) The First Five-Year Plan called for a 21-percent increase in the length of telephone and telegraph lines.(6)

The following table shows the length of telephone and telegraph lines from 1928 to 1934 (7):

Length of Telephone and Telegraph Lines (thousands of kilometers)

	1928	1932	1933	1934
Total	890.1	1,509.3	1,632.9	1,855.0
Including interurban	--	1,126.8	1,172.4	1,260.4
Of interurban, length of bronze and bimetallic	36.2	64.2	75.2	80.0

At the end of the First Five-Year Plan, the growth of telephone and telegraph lines exceeded the amount planned by 4.3 times.(8) The Second Five-Year Plan resulted in a 760,000-kilometer increase in the length of telephone and telegraph lines, or a 50.3-percent increase over the length of lines in operation on 1 January 1933. The length of bronze and bimetallic lines grew 78.2 percent and reached 114,400 kilometers during the Second Five-Year Plan.(9) The length of copper telephone circuits in 1938 was 114,000 kilometers.(4) The general length of telephone and telegraph lines at the beginning of the Third Five-Year Plan was 2,269,200 kilometers.(10) By 1940 the total length of telephone and telegraph lines had tripled and the length of wires had quadrupled in comparison with 1913.(11) In 1940 the USSR had 2,353,000 kilometers of wire at her disposal in comparison with only 503,000 kilometers in 1913.(12)

During World War II, the Germans destroyed more than 56 percent of all lines involving 65 percent of wires in the territory they occupied. More than 70 percent of nonferrous metal circuits were destroyed.(13) During World War II, the communications sector of the economy suffered a loss, which reached almost 3 billion rubles, including 2.5 billion rubles lost by the destruction of fixed assets.(14) From 1943 to 1945, 130,000 kilometers of telephone and telegraph lines were restored or newly constructed, including 700,000 kilometers of overhead wire installed in liberated territory.(13) From 1943 to 1945, 113,400 kilometers of communications lines were reconstructed, including 600,000 kilometers of overhead wire installed in the liberated oblasts.(14) A series of phototelegraph lines were destroyed during the war, but by 1946 almost all phototelegraph communications had been rebuilt.(13) In 1946 the length of nonferrous metal wires had exceeded the prewar level by 35.8 percent and the number of channels on trunk lines by 74.1 percent.(14)

If the length of telephone channels of trunk line communications in 1940 was taken as 100 percent, then in 1945 their length reached 141.2 percent and in 1950 was to reach 287.7 percent.(15) In 1946, 2,000 kilometers of cable were to have been reconstructed and laid and 300,000 channel-kilometers of telegraph communications were to be put in use, while in 1945 78,000 channel-kilometers were to be put in use. The Fourth Five-Year Plan was to restore and lay 7,800 kilometers of trunk line telephone and telegraph cable, install 50,000 kilometers of nonferrous metal overhead wire, equip the main trunk lines with modern high-frequency equipment, and restore and construct telephone and telegraph overhead lines with 200,000 kilometers of wire.

The length of all telephone channels of trunk line communications, including voice frequency channels, was to exceed the prewar level 2.8 times.(16) The Fourth Five-Year Plan also called for a complete rebuilding of the means of communications and insuring their utmost development in regions destroyed by the Germans, especially radiocommunications and trunk line cable. Telephone and telegraph communications were to be established between Moscow and all republic, kray, and oblast centers; all rayon centers were to be equipped with telephone facilities.

Capital construction of wire and cable lines planned for 1947 was completed ahead of schedule on 1 December. During the first 2 years of the Fourth Five-Year Plan, 4,600 kilometers of trunk line telephone and telegraph cable, or 59 percent of the Five-Year Plan, were restored and laid. Twenty-seven thousand kilometers of new copper wire for long-distance telephone and telegraph communication circuits were hung. By 1948, the length of nonferrous metal lines had grown 142.8 percent in comparison with 1940.(17) In 1947, the prewar length of nonferrous metal wires was exceeded by 42 percent, the length of telephone channels of trunk line communications (including voice-frequency channels) by 112.9 percent.(18) By the end of 1950, the length of trunk line communications channels was to exceed the 1941 level 2.8 times.(19)

B. Radio lines

The development of radio went hand in hand with the development of long-distance telephone and telegraph lines. Radio communications have been developed [source dated 1940] by building radio centers at all points of great economic, administrative, and political importance, especially in the Far East and Central Asia.(4) The total number of radio-communications lines in 1928 - 1929 was 93, of which 12 were trunk lines, 12 interurban lines, and 69 local lines.(5) From 1942 to 1945, more than 30,000 kilometers of radio broadcasting lines were constructed in liberated oblasts.(20) In 1946, 4,000 kilometers of radio relay lines were built and reconstructed.(21) In the course of 1946 and 1947, more than 11,000 kilometers of radio relay lines were built or reconstructed and 5,000 kilometers of overhead circuits installed.(22)

II. CATEGORIES OF THE LANDLINE SYSTEM

A. Intrarayon

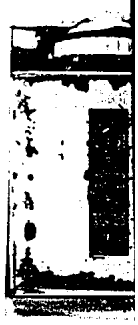
Intrarayon communications lines grew from 317,000 kilometers in 1930 to 593,000 kilometers in 1934 or 87 percent.(23) At the beginning of the Third Five-Year Plan, the length of intrarayon lines was 787,200 kilometers.(10) In 1940, there were 800,000 kilometers of wire on intrarayon communications.(12) In 1940, intrarayon communications unifilar circuits made up 45 percent of the length of all circuits.(24) In 1940, the length of intrarayon communications was almost three times as great as the length of all telephone and telegraph communications in 1913.(13) In 1947, 28,000 kilometers of intrarayon lines were reconstructed and 76,000 kilometers of overhead wires were installed.(25) The Fifth Five-Year Plan calls for building 70,000 kilometers of lines and installing 300,000 kilometers of wires.(26)

B. Intraoblast

Intraoblast communications which connect rayons with oblast centers with trunk lines were established only in the later years of the First Five-Year Plan and in the Second Five-Year Plan. On 1 January 1933, only 2,191 rayons had telegraph communications with the oblast center and only 1,418 rayons had telephone connections. On 1 January 1938, 3,383 rayons had telegraph and 3,021 had telephone communications with their oblast centers.(27)

C. Interurban

The length of interurban telephone and telegraph lines was 502,500 kilometers in 1913.(30) In tsarist Russia, all interurban communications consisted almost exclusively of steel lines.(29) There was no interurban telephone system in tsarist Russia. In 1913, almost all interurban telephone lines



were of steel (29), but there were 22,000 kilometers of copper wires.(4) In 1914, the total length of interurban telephone lines was 8,600 kilometers.(31) In 1925, the length of interurban telephone and telegraph lines was 616,300 kilometers.(30) From 1930 to 1934, the total length of wires used for interurban communications doubled.(32)

On 1 January 1938 there were 1,500,000 kilometers of wires on interurban circuits; 114,000 kilometers or only 8 percent were copper and bimetallic wires.(33) During the war, nonferrous metal circuits, which are so important for interurban communications, suffered the heaviest damage.(13) The Fourth Five-Year Plan was to make more powerful and modern equipment for interurban telephone and telegraph communications, increase the number of channels, and complete and change the configuration of the trunk-line communications network itself. It was planned to lay new cable trunk lines with a total length of 7,800 kilometers. They were to be equipped with high-quality multichannel telephone and telegraph apparatus.(15)

In 1948, 15 out of 27 oblast and republic centers which previously had had no high-frequency communications had high-frequency interurban telephone and telegraph communications over newly hung copper trunk line circuits. The prewar quantity of interurban copper and bimetallic circuits had been exceeded by 1948. Nonferrous metal lines had grown 142.8 percent in 1948 in comparison with 1940.(17) The total length of interurban telephone and telegraph wires in 1950 was to exceed the prewar level by 128,000 kilometers, and bronze and bimetallic lines, by 85,500 kilometers.(16)

III. GEOGRAPHIC DISTRIBUTION OF LINES

The prerevolutionary interurban telephone network, which consisted of 22,000 kilometers of copper wires, was concentrated almost entirely in the center of Russia. Wires connected St Petersburg with Moscow, Moscow with Khabarovsk, and Moscow with Nizhniy-Novgorod. With the exception of a few minor connections, a long-distance telephone connection using nonferrous metal wires existed only between Rostov and Novorossiysk, Tiflis (Tbilisi) and Baku. From 1921 to 1925, the length of nonferrous metal wire circuits had almost doubled; communications were established between Khar'kov and Kiev and Moscow and Minsk. The first lines were installed in the Urals, between Nizhnyy-Tagil and Sverdlovsk. Construction of communication lines was started in Central Asia and in the East from 1921 - 1925.

At the beginning of the Second Five-Year Plan the following circuits had been established: Moscow-Novosibirsk—Stalinsk; Arkhangelsk-Vologda, (which permitted the establishment of communications between Moscow and Arkhangelsk); and Kirsanov-Saratov, which continued from Saratov to Stalingrad and thence to Moscow. At the end of the Second Five-Year Plan, an overhead wire circuit was installed between Moscow and Khabarovsk and Moscow and Tashkent; also a number of connections with the Far East, Central Asia, and the Transcaucasus were established. The length of interurban telephone and telegraph lines in percentage of the total in 1928 and 1939 was as follows (4):

	1928	1939
RSFSR	69.9	67.3
Including:		
Oblasts of Siberia without Far East	9.1	13.5
Oblasts of the Far East	5.3	5.8

	1928	1939
Ukrainian SSR	17.3	15.1
Belorussian SSR	4.3	6.1
Georgian, Azerbaydzhan, and Armenian SSRs	3.5	3.9
Uzbek SSR	1.4	1.5
Turkmen and Tadzhik SSRs	0.8	1.3
Kazakh and Kirgiz SSRs	2.8	4.8
	100.0	100.0
Rate of growth	100	177.3

The construction of copper circuits to the East and the Southeast began between 1925 and 1929. The construction of a circuit was finished to Samara /now Kuybyshev/ and another to Molotov-Sverdlovsk.(5) From 1930 to 1934, long-distance telephone communications using copper circuits were established through Sverdlovsk to Novosibirsk and Stalinsk. Telegraph communications using Bodo apparatus were established between Moscow-Khabarovsk, Moscow-Vladivostok, Leningrad-Sverdlovsk-Novosibirsk, Sverdlovsk-Samara, Tiflis-Odessa, and a number of others.(32) New radiotelephone and radiotelegraph trunk lines between Moscow and the largest cities of the country were opened in 1946, as were a series of new international radio communications.

In 1946, construction was started on new overhead telephone and telegraph trunk lines between Alma-Ata and Rubtsovsk, Akmolinsk and Kokchetav, and others. The Alma-Ata--Rubtsovsk line permitted direct communications between Central Asia and Siberia.(34) The Fourth Five-Year Plan called for connecting Moscow and Leningrad by a coaxial cable which would open 200 or more telephone channels and would also transmit television programs. The Moscow-Khar'kov cable has more than 100 telephone and a large number of telegraph channels. In 1946, a whole series of telephone and telegraph trunk lines -- Moscow-Leningrad, Moscow-Rostov, Moscow-Saratov, Rostov-Tbilisi-Baku, Rostov-Krasnodar-Sochi, and others -- were to be equipped with multichannel communications apparatus that would permit a great increase in the number of channels. More than 6,000 kilometers of copper circuit wires were also to be hung in 1946.(16)

In 1932 the first radiotelephone trunk line was built from Moscow to Tashkent; two more were built in 1934 between Moscow and Tbilisi and Moscow and Novosibirsk.(32)

IV. EQUIPMENT

A. Telegraph

In 1914, of the total of 8,225 telegraph apparatuses (hereafter referred to as units), 7,241 were Morse and 600 were Hughes.(35) During the Second Five-Year Plan, the total number of telegraph units increased 1.5 times and the number of teletype machines grew 2.4 times. The number of phototelegraph installations increased 16 times and reached 32.(36) At the beginning of the Third Five-Year Plan, there were 13,243 telegraph units in operation, 4,526 of them being teletype machines.(37) In 1938, Bodo units were used on trunk lines and Morse and Klopfer used only for intraoblast and local communications.(33) From 1923 to 1940, the number of teletype machines increased six times.(13)

Plans for the Fourth Five-Year Plan included equipping the basic trunk lines with modern high-frequency apparatus and installing 55 telephone and telegraph transmitters, 20 of them in central regions to increase radio communications with the Far East, Kazakhstan, Central Asia, and the Transcaucasus.(16) The Fourth Five-Year Plan was to equip trunk-line communications with the most modern units. If the number of start-stop apparatuses in operation in 1940 is taken as 100 percent, then in 1945 there were to be 490 percent, and in 1950, 812 percent. It was also planned to increase the use of Bodo units which had worked so well on long-distance trunk-line communications and were therefore to remain one of the basic pieces of equipment used by the system. Before the war, the most widespread type of Bodo units was the duplex and triplex units; in 1947, powerful multiplex bands (six and nine) were being installed. The only parts of the old sets that were to remain were the receiving unit and the keyboard, all other parts having undergone considerable change. After 1947, multiple channel apparatus of high-frequency telephony without transmission to a carrier frequency line was to be used on a large scale. Gradually it was to displace high-frequency apparatus of the old type with transmission to a carrier frequency line (SMUT-35).

In 1947, new equipment for the three- and 12-channel system of high-frequency telephony and voice-frequency telegraph equipment was in use in communications in the largest administrative, economic, and industrial centers of the country: Leningrad, Rostov, cities of the Ukraine, Belorussia, Siberia, and others.(15) Nine Moscow radio links with the largest centers of the country and 14 oblast radio connections were changed over to teletype equipment in 1946. The volume of traffic handled by teletype machines grew 74.7 percent for 1946.(34) By 1947, twenty-eight 5,000-watt repeater units had been installed and put in use in the most important centers of the country: Riga, Rostov, Krasnodar, Kursk, Vladimir, Ivanovo, Molotov, Ryazan', Sverdlovsk, Tula, Tbilisi, and others. New repeater equipment of 100 watts (type RTU-100B) and 500 watts (type TU-500) was introduced in 1946.(21) In 1947, high-speed equipment made up 33 percent of all telegraph equipment.(13) In 1947, the prewar level of teletype machines had increased 100 percent.(18)

In 1913, 36 million telegrams were sent in the Soviet Union (13); in 1937, 102 million (12) were sent, and in 1946, 175 million (13). In 1947, the prewar volume of telegrams sent was exceeded 25 percent.(18). In 1940, radiotelegrams made up from 70 to 80 percent of the volume of all telegrams.(12) In 1947, there were 31,500 telegram transmitting and receiving stations for general use in the USSR.(13)

B. Telephone

In 1913, there were 200,000 telephones in Russia (35), of which 162,000 were in Moscow.(38) In 1913, the number of telephone subscribers on urban telephone networks was 187,400.(30) In 1922, there were 89,000 telephones in Moscow.(38) There were 158,700 subscribers on urban telephone networks in 1925.(30) The number of interurban telephone calls was exceeded by 20.5 percent during the First Five-Year Plan.(8) In 1928, there were 235,000 telephone subscribers in cities and rayon centers. In 1932, there were 424,700 telephone subscribers in cities and rayon centers; in 1933, there were 467,000, and in 1934, 534,700.(7) In 1938, the USSR had more than one million telephone sets, about 25 percent of them were on the automatic system.(12) In 1940, the number of telephones in the USSR had grown more than seven times in comparison with 1913.(13).

The number of telephones connected with automatic telephone exchanges in cities was 271,800 at the beginning of the Third Five-Year Plan.(10) In 1938, the capacity of automatic telephone exchanges comprised 32 percent of the total capacity of all telephone exchanges.(28) In 1940, more than 40 percent

of the telephones of the Ministry of Communications were connected to automatic exchanges. During the war, the Germans destroyed telephone exchanges with an installed capacity of 325,000 numbers; 110,000 of these numbers were connected to automatic telephone exchanges.(13) At the beginning of the Fourth Five-Year Plan, the capacity of urban telephone exchanges in the USSR was 22.3 percent lower than the prewar level; their capacity was lowered 54.4 percent in territories occupied by the Germans.(39) In 1947, 67 urban telephone exchanges, 33 of which were automatic, were installed.(18) Automatic telephone exchanges in operation on 1 January 1946 included Chelyabinsk, Ufa, Kazan', Kuybyshev, Gor'kiy, Ivanovo, Smolensk, Stavropol', L'vov, Uzhgorod, Drogobych, and Stanislav.

According to the Fourth Five-Year Plan, the distribution of automatic telephone exchanges was planned as follows in republic, oblast, and kray centers by the end of 1950: ATS to be expanded included those in Sverdlovsk, Molotov, Kirov, Moscow, Leningrad, Tallin, Riga, Kiev, Khar'kov, Stalingrad, Tbilisi, Baku, Tashkent, Novosibirsk, Stalino, Arkhangel'sk; ATS were to be constructed in Murmansk, Petrozavodsk, Yaroslavl', Kalinin, Vil'nyus, Minsk, Mogilev, Gomel', Chernigov, Orel, Kursk, Voronezh, Saratov, Astrakhan', Groznyy, Yerevan, Krasnodar, Simferopol', Kherson, Nikolayev, Zaporozh'ye, Dnepropetrovsk, Vinnitsa, Kishinev, Chernovtsy, Odessa, Ashkhabad, Stalinabad, Frunze, Alma-Ata, Tomsk, Krasnoyarsk, Akaban, Ulan-Ude, Chita, Khabarovsk, Voroshilovgrad, Vladivostok, Brest, Saransk, Ul'yanovsk, Tambov, Tula, Poltava, Kirovgrad, and Rostov.(39)

The number of localities which have been equipped with telephone and telegraph facilities from 1932 to 1934 were as follows (7):

	1932	1933	1934
In rayon centers and isolated cities:			
Number of rayon center and isolated cities having telegraph communications with republic, oblast, and kray centers	2,191	2,224	2,302
Percentage of total	86.5	88.0	90.0
Same, telephone	1,418	1,549	1,835
Percentage of total	56.0	61.3	71.7
Number of following which have telephone communications with their rayon centers			
Village soviets	24,713	30,244	36,770
Percentage of total	38.8	47.6	58.2
MTS	1,528*	2,541	3,194
Sovkhozes	1,802*	3,011	4,232

*This does not include the northern Caucasus and Western Siberia.

The following shows the percentage of village soviets equipped with telephone facilities (20): 1932, 39.1; 1935, 58.4; 1937, 72.3; 1941, 75.8; and 1947, 72.3.

The percentage of MTS equipped with telephone facilities in 1937, 1941, and 1947 was as follows (20): 1937, 88.3; 1941, 91.0; and 1947, 95.3. The percentage of sovkhozes equipped with telephone facilities in 1941 was 73.9.(20) In 1947, 9,409 village soviets, MTS, sovkhozes, and kolkhozes were equipped with telephone facilities.(25) In 1947, more than 75 percent of the village soviets and more than 90 percent of all MTS were equipped with telephone facilities.(13)

C. Radio

The number of radiobroadcasting stations in the USSR between 1922 and 1947 was as follows:

Year	Number	Source
1922	1	(40)
1924	3	(40)
1925	10	(30)
1928	23	(7)
1930	41	(41)
1932	57	(40)
1933	67	(40)
1938	77	(37)
1938	90	(40)
1947	130	(20)

The number of radios in the USSR in 1924, 1929, and 1940 was as follows:

Year	Number	Source
1924	24,750	(42)
1929	554,300	(41)
1940	1,000,000	(43)

The number of wired radio centers in the USSR between 1928 and 1952 was as follows:

Year	Number	Source
1928	179	(7)
1932	4,808	(7)
1933	5,015	(7)
1934	6,000	(43)
1952	20,000	(44)

The first powerful wired radio center was equipped by the Moscow city council of trade unions in 1925.(45) From 1930 to 1940, the number of wired radio centers grew 18 times.(20) At the beginning of World War II, there were 11,000 wired radio centers in the USSR.(43) In 1941, the People's Commissariat of Communications had 4,000 wired radio centers.(46) During World War II, 1,200 wired radio centers were destroyed.(13) After the war, more than 1,400 wired radio centers were reconstructed or built anew. From 1942 to 1945, 1,800 wired radio centers of the People's Commissariat of Communications were built in liberated oblasts.(20) In 1947, 725 wired radio centers were reconstructed or built -- 117 percent of the plan.(18) Two thousand three hundred wired radio centers were to be built during the Fourth Five-Year Plan.(21)

In 1947, more than 4,500 wired radio centers of the Ministry of Communications serving 1,800,000 wired radio speakers were found in rayon, uyezd, and volost' centers.(21) In the radio network of the Ministry of Communications, 1,400 wired radio centers were reconstructed or newly built from the beginning of the Fourth Five-Year Plan to November 1947.(20) In 1950, 1951, and 9 months of 1952, the number of kolkhoz wired radio centers increased two times and their power and the length of wire increase almost three times.(47) The 1953 plan calls for construction of twice the number of wired radio centers in the country than were built in 1952.(44)

The number of wired radio speakers in the USSR from 1928 to 1952 was as follows:

Year	Number	Source
1928	22,100	(7)
1929	348,000	(48)
1932	1,360,800	(7)
1933	2,300,000	(48)
1933	1,280,000	(7)
1934	1,451,900	(7)
1952	10,000,000	(44)

From 1930 to 1940, the number of wired radio speakers in the Soviet Union grew 57 times.(20) In 1941, the People's Commissariat of Communications had 5 million wired radio speakers.(46) During the war, 80 percent of all wired radio speakers were destroyed. During the first postwar years the transmitting and receiving networks were completely reconstructed and networks in the eastern oblasts of the country were considerably expanded.(13) From 1942 to 1945, more than 1,600,000 wired radio speakers were installed in liberated oblasts.(20) In 1946, the number of wired radio speakers grew 10.7 percent.(34) At the end of 1946, the prewar quantity of wired radio speakers was exceeded 14.2 percent.(20)

During 1947, the number of wired radio speakers grew by 700,000 units. By the end of 1947, the number of wired radio speakers in the USSR exceeded the prewar level by 27 percent.(18) Four million wired radio speakers were to be built during the Fourth Five-Year Plan; 3,150,000 of them were to be connected to wired radio centers of the Ministry of Communications.(21) In 1946, there were 5,500,000 wired radio speakers under the Ministry of Communications.(13) In 1947, 1,800,000 wired radio speakers were found in rayon, uyezd, and volost' centers under the Ministry of Communications.(21) From 1950 to 1951, the plan for wired radio speakers was fulfilled by only 50 percent. According to the Fifth Five-Year Plan, the number of wired radio speakers in villages are to be increased 4.5 times.(47)

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